Citation:

Hunter JE, Zhang J, Kris-Etherton PM. Cardiovascular disease risk of dietary stearic acid compared with trans, other saturated, and unsaturated fatty acids: A systematic review. *Am J Clin Nutr*. 2010 Jan; 91(1): 46-63.

PubMed ID: 19939984

Study Design:

Meta-analysis or Systematic Review

Class:

M - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

A systematic review, using univariate and multivariate regression analysis of all selected studies, on the effect of stearic acid on LDL-cholesterol when substituted for saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA), carbohydrate, or trans-fatty acids.

Inclusion Criteria:

- Medline (www.pubmed.org), The Cochrane Library (www.cochrane.org), Biological Abstracts and Commonwealth Agricultural Bureau (www.cabi.org) databases
- Key words used in the search: Trans fat/trans fatty acid (TFA)
- Diets that were well-defined. Endpoints included effects on concentrations of plasma lipids, lipoproteins, hemostatic factors and markers of inflammation. A total of 32 experimental studies met the criteria
- Criteria included English language experimental and observational human studies that evaluated the effects of stearic acid-rich (STA) fats on the major endpoints assessed for cardiovascular disease (CVD)
- Included studies had to have a control treatment [a diet high in saturated fatty acids, high in carbohydrate, a baseline (habitual) diet, or high in MUFAs or PUFAs]; a feeding period of
- STA, stearate, saturated fat or saturated fatty acids
- From January 1957 to May 2008
- A total of 226 studies were identified.

Exclusion Criteria:

- Less than 18 years

- Less than eight subjects completing the study
- Studies less than two weeks in duration
- Subjects consumed self-selected diets
- No control diet
- Study used isotopes
- No dietary fatty acid analyses
- No CVD-related endpoint measurements
- No information provided about the control for body weight; physical activity; and carbohydrate, protein or cholesterol intakes between treatment groups.

Description of Study Protocol:

Design

Systematic review.

Statistical Analysis

Univariate and multivariate regression analysis.

Data Collection Summary:

Not applicable.

Description of Actual Data Sample:

Location

International.

Summary of Results:

- In comparison with SFA, stearic acid lowered LDL-cholesterol, was neutral with respect to HDL-cholesterol and lowered the ratio of total to HDL-cholesterol
- In comparison with unsaturated fatty acids, MUFA and PUFA, stearic acid tended to raise LDL-cholesterol, lower HDL-cholesterol and increase the ratio of total to HDL-cholesterol
- Univariate regression analysis of the data substituting stearic acid for cholesterol-raising SFA indicated that the LDL-cholesterol concentration decreases as dietary stearic acid increases. The univariate regression coefficient for this relation was -0.036 (P=0.034)
- The regression coefficient suggests that for each 1% of energy increase in stearic acid, when substituted for cholesterol-raising SFA, the LDL-cholesterol concentration could decrease by 0.036 mmol per L
- When multivariate regression analysis was done, with adjustments for both between-study and within-study variation, the multivariate regression coefficient for this relation was 0.043 (P<0.001), suggesting that for each 1% energy increase in cholesterol-raising SFA, when substituted for stearic acid, the LDL-cholesterol concentration would increase by 0.043mmol per L
- A one-to-one substitution of stearic acid for trans fatty acids showed a decrease or no effect

on LDL-cholesterol, an increase or no effect on HDL-cholesterol and a decrease in the ratio of total to HDL-cholesterol.

Author Conclusion:

TFA intake should be reduced as much as possible because of its adverse effects on lipids and lipoproteins. The replacement of TFA with STA compared with other saturated fatty acids in foods that require solid fats beneficially affects LDL-cholesterol, the primary target for CVD risk reduction; unsaturated fats are preferred for liquid fat applications.

Reviewer Comments:

None.

Research Design and Implementation Criteria Checklist: Review Articles

Relevance Questions

1.	Will the answer if true, have a direct bearing on the health of patients?	Yes
2.	Is the outcome or topic something that patients/clients/population groups would care about?	Yes
3.	Is the problem addressed in the review one that is relevant to nutrition or dietetics practice?	Yes
4.	Will the information, if true, require a change in practice?	Yes

Validity Questions

1.	Was the question for the review clearly focused and appropriate?	Yes
2.	Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search termsused described?	Yes
3.	Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?	Yes
4.	Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?	No
5.	Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?	Yes
6.	Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?	Yes

7.	Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issued considered? If data from studies were aggregated for meta-analysis, was the procedure described?	Yes
8.	Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?	Yes
9.	Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed?	Yes
10.	Was bias due to the review's funding or sponsorship unlikely?	Yes